SIIC12
REACTOR: EFFECTS OF DIFFERENT PRESSURE AND TEMPERATURE ANALYSIS USING ANSYS

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Abstract:
There are collective of incident regarding reactor safety that cause fatality either towards humans, environment and towards facilities. This incident has open the world eyes to prioritize safety especially in processing industry involving reactor. Thus, this study will focus on the fixed bed reactor reliability of the effect of pressure and temperature through analysis using ANSYS software in methanol synthesis process.

Keywords:
ANSYS, temperature, pressure, reactor reliability

Objective:
- a) To study the effect of pressure on a fixed bed reactor by using ANSYS software.
- b) To investigate the impact of temperature on a fixed bed reactor by using ANSYS software.

Methodology:
The study was conducted by using un-destructive method with the help of ANSYS software. Study focus on the reactor tube with the design taken from the "Analysis of a 2-D model of a packed bed reactor for methanol production by means of CO2 hydrogenation" paper written by Grazia Leonzio and Pier Ugo Foscolo.

Chart 1: Flowchart of process flow
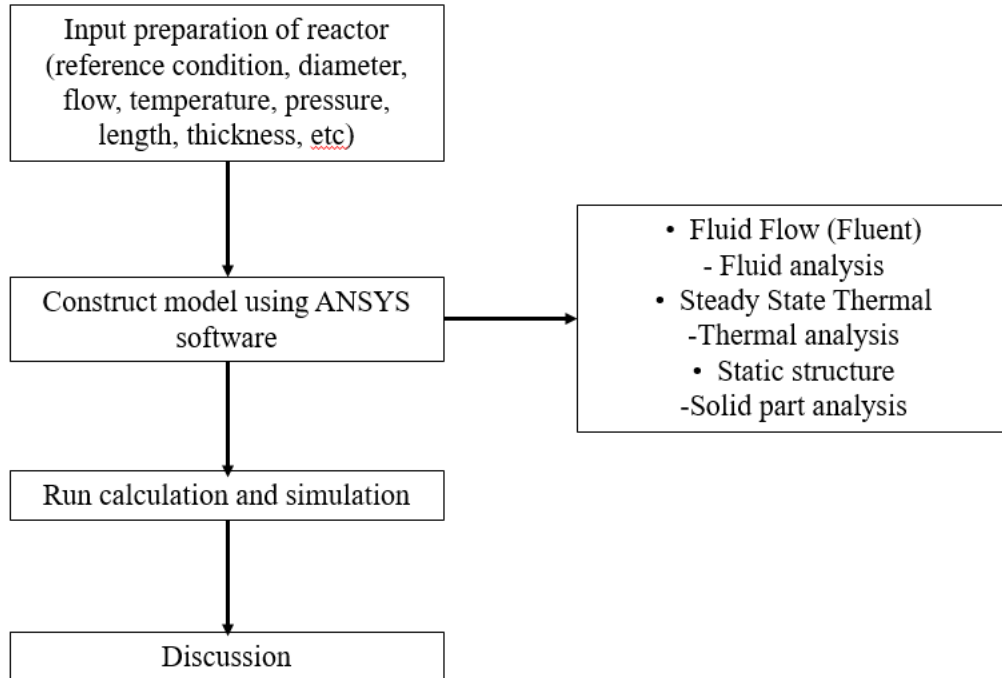
Result:

Figure 1: Life contour of tube at 498K

Figure 2: Plane contour of tube at temperature at 498K

Chart 1: Flowchart of process flow

Result:

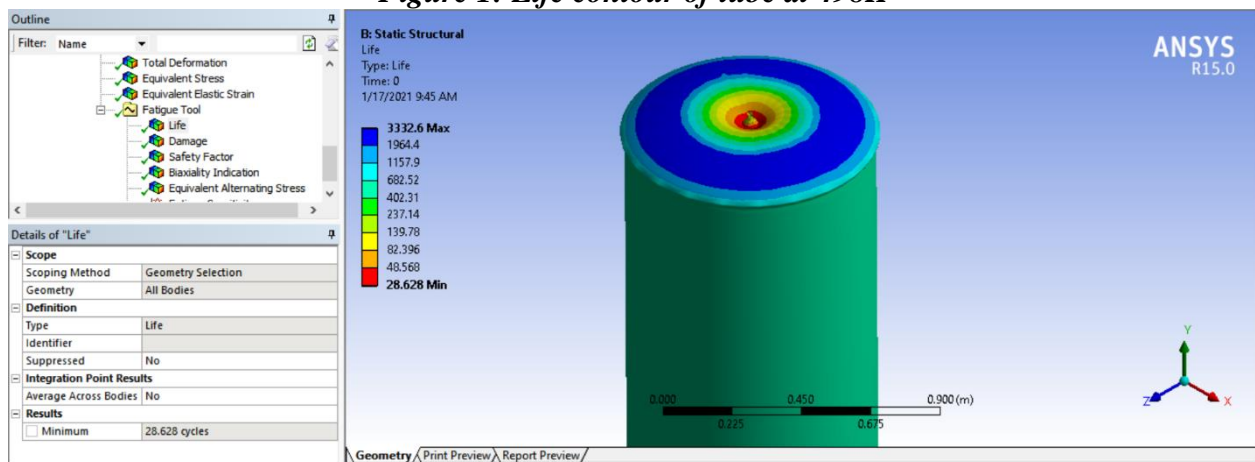***Figure 1: Life contour of tube at 498K***

Figure 2: Plane contour of tube at temperature at 498K
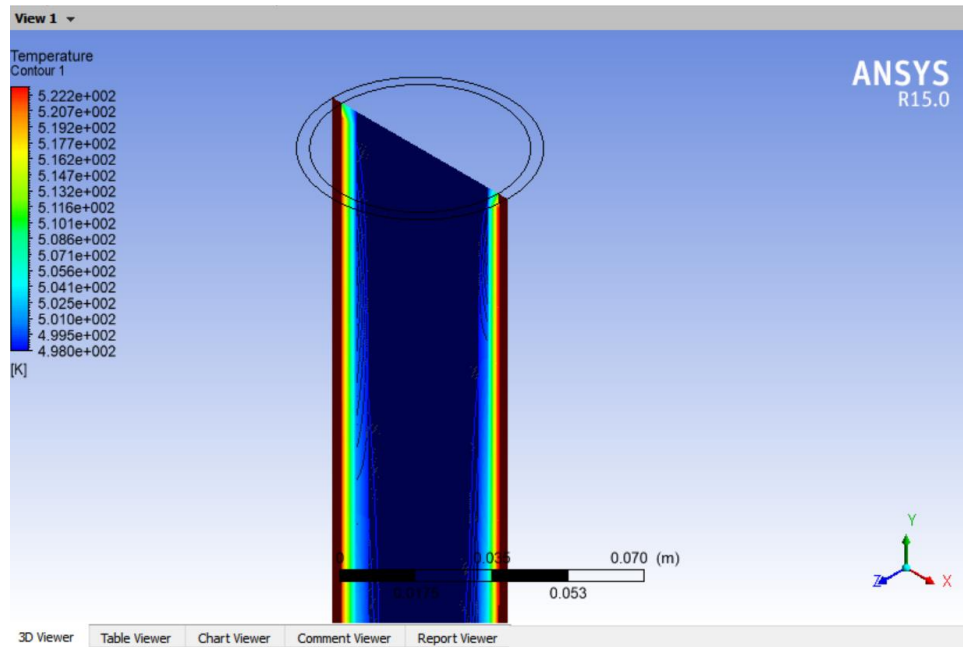
Table 1: Result table

Pressure (Pa)	Minimum Lifecycle	Temperature (K)	Minimum Lifecycle
525, 000 00 Pa	19	498K	28
529, 000 00 Pa	2	670K	10
530, 000 00 Pa	0	676K	0

Conclusion:

This study aim to understand the effect of pressure and temperature on the reliability of reactor tube in a methanol synthesis process using ANSYS software. The result obtain shows the greater the pressure inlet, the less number of tube cycles. Same goes to the temperature analysis, as the temperature increase, the number of tube cycles decreased. The tube reactor maximum temperature and pressure are determined when the number of cycles reading shows zero, that indicate the point where the tube experience fatal damage such as crack formation. The maximum pressure obtain through the simulation is 530, 000 00 Pa while the maximum temperature where the lifecycle is zero is 676K.